

Claims

What is claimed is:

1. A method of calculating capacity of an intelligent battery equipped with a current measurement circuit to measure an electric current value on which calculation of battery capacity is based, comprising the steps of:

(a) sending, from a system to the intelligent battery, a notice that it shifts to a low electric power consumption mode, and a consumption electric current value or a consumption electric power value in the low electric power consumption mode unique to the system, when the system using the intelligent battery shifts from a normal operational mode to the low electric power consumption mode;

(b) performing subtraction of capacity data of the intelligent battery based on the received consumption electric current value or consumption electric power value in the low electric power consumption mode, and disabling capacity calculation by the current measurement circuit;

(c) sending, from the system to the intelligent battery, a notice of shifting to the normal operational mode, and stopping the subtraction of capacity data based on the consumption electric current value or consumption electric power value in the low electric power consumption mode, and enabling capacity calculation by the current measurement circuit,

when the system using the intelligent battery shifts from the low electric power consumption mode to the normal operational mode.

2. The method of calculating capacity of an intelligent battery according to Claim 1, wherein said low electric power consumption mode is a soft-off state or a suspended state in ACPL.

3. The method of calculating capacity of an intelligent battery according to Claim 1, wherein said intelligent battery is SBS-compliant and a notice of the mode shifting from the system to the battery and the consumption electric current value or consumption electric power value in the low electric power consumption mode is sent by defining in one command or a plurality of commands of OptionalMfgFunction1 to OptionalMfgFunction5 of SBS.

4. The method of calculating capacity of an intelligent battery according to Claim 1, wherein, in the low electric power consumption mode:

(a) on detecting that the intelligent battery is drawn out of the system, the subtraction of capacity data based on the received consumption electric current value or consumption electric power value in the low electric power consumption mode is stopped;

(b) next, on detecting that the intelligent battery is connected to the system, the battery

counts time from the connection; and

(c) when the system using the intelligent battery shifts from the low electric power consumption mode to the normal operational mode:

(i) the system sends a notice is sent to the effect that it is reconnected to the intelligent battery and also sends the consumption electric current value or consumption electric power value in the low electric power consumption mode unique to the system;

(ii) capacity to be subtracted from reconnection is calculated from the received consumption electric current value or consumption electric power value and the counted time, and the calculated capacity to be subtracted is subtracted from the capacity data; and

(d) next, a notice is sent from the system to the intelligent battery to the effect that it shifts to the normal operational mode and also the subtraction of capacity data based on the consumption electric current value or consumption electric power value in the low electric power consumption mode is stopped, and capacity calculation by the current measurement circuit is enabled on the other hand.

1 5. The method of calculating capacity of an intelligent battery according to Claim 1,

2 wherein, in the low electric power consumption mode:

3 (a) on detecting that the intelligent battery is drawn out of the system, that the intelligent
4 battery stops the subtraction of capacity data based on the consumption electric current
5 value or consumption electric power value received in the low electric power
6 consumption mode;

7 (b) next, on detecting that the intelligent battery is connected to the system:

8 (i) the system recognizing the connection sends a notice to the effect that it is reconnected
9 to the intelligent battery and also sends the consumption electric current value or
10 consumption electric power value in the low electric power consumption mode unique to
11 the system;

12 (ii) the intelligent battery resumes subtraction of capacity data based on the received
13 consumption electric current value or consumption electric power value in the low
14 electric power consumption mode, and disables capacity calculation by the current
15 measurement circuit on the other hand;

16 (c) when the system using the intelligent battery shifts from the low electric power

consumption mode to the normal operational mode, the system sends a notice to the battery that it shifts to the normal operational mode and also stops the subtraction of capacity data based on the consumption electric current value or consumption electric power value in the low electric power consumption mode, and enables capacity calculation by the current measurement circuit on the other hand.

6. A method of calculating capacity of an intelligent battery equipped with a current measurement circuit to measure an electric current value on which calculation of battery capacity is based, comprising the steps of:
 - (a) on a shift of the system from a normal operational mode to a low electric power consumption mode and thereafter to the normal operational mode, calculating on the system side consumption battery capacity data assumed to have been spent during the low electric power consumption mode based on a consumption electric current value or a consumption electric power value in the low electric power consumption mode unique to the system.
 - (b) sending consumption battery capacity data from the system side to said intelligent battery side;
 - (c) on said intelligent battery side, calculating current battery capacity based on said consumption battery capacity data.

1 7. An intelligent battery for use with a portable electronic device having a first system
2 component for operating with supplied electric power in a normal operational mode but
3 not operating with no supplied electric power in the low electric power consumption
4 mode, and a second system component for operating with supplied electric power both in
5 the normal operational mode and in the low electric power consumption mode, and a
6 controller for supplying electric power to said first and second system components in the
7 normal operational mode and supplying electric power to said second system component
8 and stopping supply of electric power to said first system component in the low electric
9 power consumption mode, comprising:

10 (a) a timer;

11 (b) a mode shift notice receiving unit for receiving a mode shift notice indicating a shift
12 from the normal operational mode to the low electric power consumption mode or a shift
13 from the low electric power consumption mode to the normal operational mode and a
14 consumption electric current value or a consumption electric power value in the low
15 electric power consumption mode unique to the second system component;

16 (c) a unit for calculating capacity data to be subtracted based on a period of the low
17 electric power consumption mode after shifting to the mode measured by the timer and
18 the received consumption electric current value or consumption electric power value in
19 the low electric power consumption mode.

8. An intelligent battery for use with a portable electronic device having a first system component for operating with supplied electric power in the normal operational mode but not operating with no supplied electric power in the low electric power consumption mode, and a second system component for operating with supplied electric power both in the normal operational mode and in the low electric power consumption mode, and a controller for supplying electric power to said first and second system components in the normal operational mode and supplying electric power to said second system component and stopping supply of electric power to said first system component in the low electric power consumption mode, comprising:

(a) a timer;

(b) a mode shift notice receiving unit for receiving a mode shift notice indicating a shift from the normal operational mode to the low electric power consumption mode or a shift from the low electric power consumption mode to the normal operational mode and, based on a consumption electric current value or a consumption electric power value in the low electric power consumption mode unique to the second system component calculated on the system side, consumption battery capacity data assumed to be consumed during the low electric power consumption mode;

(c) a unit for calculating capacity data to be subtracted based on a period of the low electric power consumption mode after shifting to the mode measured by the timer and the received consumption battery capacity data in the low electric power consumption mode.

1 9. A portable electronic device, comprising:

2 (a) a first system component for operating with supplied electric power in the normal
3 operational mode but not operating with no supplied electric power in the low electric
4 power consumption mode;

5 (b) a second system component for operating with supplied electric power both in the
6 normal operational mode and in the low electric power consumption mode; and

7 (c) a controller for:

8 (i) performing control to supply electric power to said first and second system
9 components, and supply electric power to said second system component and stop supply
10 of electric power to said first system component in the low electric power consumption
11 mode;

12 (ii) when shifting from the normal operational mode to the low electric power
13 consumption mode, sending to an intelligent battery a notice of shifting to the low electric
14 power consumption mode and also sending a consumption electric current value or a
15 consumption electric power value unique to the system and

16 (iii) when shifting from the low electric power consumption mode to the normal

operational mode, sending from the system to the intelligent battery a notice of shifting to the normal operational mode; and

said intelligent battery characterized by:

(iv) in the low electric power consumption mode, performing subtraction of capacity data based on the received consumption electric current value or consumption electric power value in the mode, and disabling capacity calculation on the current measurement circuit on the other hand;

(v) when shifting from the low electric power consumption mode to the normal operational mode, stopping the subtraction of capacity data based on the consumption electric current value or consumption electric power value in the low electric power consumption mode, and enabling capacity calculation by the current measurement circuit on the other hand.

10. A portable electronic device, comprising:

(a) a first system component for operating with supplied electric power in a normal operational mode but not operating with no supplied electric power in a low electric power consumption mode;

(b) a second system component for operating with supplied electric power both in the normal operational mode and in the low electric power consumption mode; and

(c) a controller for:

(i) performing control to supply electric power to said first and second system components, and supply electric power to said second system component and stop supply of electric power to said first system component in the low electric power consumption mode;

(ii) when shifting from the normal operational mode to the low electric power consumption mode, sending from a system to an intelligent battery a notice of shifting to the low electric power consumption mode and also sending consumption battery capacity data assumed to be consumed during the low electric power consumption mode based on a consumption electric current value or a consumption electric power value in the low electric power consumption mode unique to the second system component calculated on the system side; and

(iii) when shifting from the low electric power consumption mode to the normal operational mode, sending from the system to the intelligent battery a notice of shifting to the normal operational mode; and

said intelligent battery characterized by:

(iv) performing subtraction of the capacity data based on the received consumption battery capacity data in the low electric power consumption mode, and disabling capacity calculation on the current measurement circuit on the other hand;

(v) when shifting from the low electric power consumption mode to the normal operational mode, stopping the subtraction of capacity data based on the consumption current capacity data in the low electric power consumption mode, and enabling capacity calculation by the current measurement circuit on the other hand.